

Combining Functions - Notes 1

ADDING FUNCTIONS

$$(f+g)(x) = f(x) + g(x)$$

- Simply leave the functions unchanged, add them together, and combine like terms.

Example 1: $f(x) = x^2 + 4x + 5$
 $g(x) = x - 7$

$$\begin{aligned}(f+g)(x) &= f(x) + g(x) \\ &= x^2 + 4x + 5 + x - 7 \quad (\underline{\hspace{2cm}}) \\ &= \boxed{x^2 + 5x - 2} \quad (\underline{\hspace{2cm}})\end{aligned}$$

Describe what's happening in each step

Ex 2: $f(x) = -2x^3 + x^2 - 1$
 $g(x) = x^2 + x + 3$

$$\begin{aligned}(f+g)(x) &= f(x) + g(x) \\ &= \underline{\hspace{2cm}} + \underline{\hspace{2cm}} \\ &= \boxed{\hspace{4cm}}\end{aligned}$$

Complete the example

* Remember, when you simplify you just combine like terms. Don't change any signs (like you do when you solve equations).

■ On a separate sheet, do p. 387 # 5, 17, 19
(Adding only)

Combining Functions - Notes 2

SUBTRACTING FUNCTIONS

$$(f-g)(x) = f(x) - g(x)$$

• Just subtract the second function from the first.

* Be sure to distribute the negative!

Example 1: $f(x) = x^2 + 2x - 3$

$$g(x) = x + 1$$

$$(f-g)(x) = f(x) - g(x)$$
$$= x^2 + 2x - 3 - (x + 1)$$

Why do I need parentheses?

$$= x^2 + 2x - 3 - x - 1$$

$$= \boxed{x^2 + x - 4}$$

Describe the steps

Ex 2: $(g-f)(x) = g(x) - f(x)$

$$= \quad - (\quad)$$

$$= \quad (\quad)$$

$$= \boxed{\quad} (\quad)$$

Complete the example \Rightarrow

On separate sheet, do p. 387 # 5, 17, 19
(Subtracting only)

Combining Functions - Notes 3

MULTIPLYING FUNCTIONS

means to leave
< instead of
ugging in a
number.

does NOT
mean to multiply
by x at the end!

$$(f \cdot g)(x) = f(x) \cdot g(x)$$

- Multiply one function by the other
- distribute to simplify

Example 1: $f(x) = 3x$, $g(x) = x + 2$

$$\begin{aligned}(f \cdot g)(x) &= f(x) \cdot g(x) \\ &= 3x(x + 2) \\ &= \boxed{3x^2 + 6x}\end{aligned}$$

← Describe the steps

Example 2: $f(x) = x^2 + 5x$ $g(x) = 3x - 2$

$$\begin{aligned}(f \cdot g)(x) &= f(x) \cdot g(x) \\ &= (\quad) (\quad)\end{aligned}$$

Compute
the example →

$$= \boxed{}$$

■ On a separate sheet, do p. 387 #5, 17, 19
(multiplying only)

Combining Functions - Notes 4

DIVIDING FUNCTIONS

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

- Simplify, put the function indicated on top of the other (then you're done!)

Example 1: $f(x) = x + 2$, $g(x) = 3x$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \boxed{\frac{x+2}{3x}}$$

* Note that in the new function $\left(\frac{f}{g}\right)(x) = \frac{x+2}{3x}$,

X CANNOT be 0 (because I can't divide by 0).

$$\square \left(\frac{g}{f} \right)(x) = \frac{g(x)}{f(x)} = \frac{3x}{x+2}$$

* Note $x+2 \neq 0$ so $x \neq -2$!
 \uparrow
 symbol for not equal

On a separate sheet, do p. 387 #5, 17, 19
(dividing only)